WHAT IS CLAIMED IS:

1. A semiconductor apparatus comprising:

a substrate;

a buffer layer made of a monocrystal semiconductor material and formed on the substrate;

a strained-Si layer formed on the buffer layer and having a lattice constant different from that of the buffer layer;

a monocrystal insulating film formed on the strained-Si layer, the monocrystal insulating film being made of a material having a rare earth structure with a lattice constant different from that of Si; and

an electrode formed on the insulating film.

2. The semiconductor apparatus according to claim 1, wherein the electrode is made of a crystalline semiconductor material.

3. The semiconductor apparatus according to claim 2, wherein the electrode is made of crystalline SiGe.

4. The semiconductor apparatus according to claim 1, wherein the insulating film is a monocrystal film including one selected from the group consisting of CeO_2, PrO_2, CaO_2, TbO_2, PrO_2, Dy_2O_3, Er_2O_3, Eu_2O_3, Gd_2O_3, Ho_2O_3, In_2O_3, La_2O_3, Lu_2O_3, Nd_2O_3, Pr_2O_3, Sm_2O_3, Tb_2O_3, TI_2O_3, Tm_2O_3, Y_2O_3 and Yb_2O_3.

5. The semiconductor apparatus according to claim 1, wherein the buffer layer is made of

monocrystal SiGe.

6. The semiconductor apparatus according to claim 1, wherein the buffer layer is formed on the silicon substrate through the insulating film.

7. A semiconductor apparatus comprising:

a substrate;

a buffer layer made of a monocrystal semiconductor material and formed on the substrate;

a strained-silicon layer formed on the buffer layer and having a lattice constant different from that of the buffer layer;

a source region and a drain region formed in the strained-silicon layer so as to be separated from each other;

a gate insulating film formed on the strained-silicon layer sandwiched between the source region and the drain region and made of a monocrystal rare earth oxide having a lattice constant different from that of silicon; and

a gate electrode formed on the gate insulating film.

8. A semiconductor apparatus according to claim 7, wherein the gate electrode is made of a crystalline semiconductor material.

9. The semiconductor apparatus according to claim 7, wherein the gate electrode is made of crystalline SiGe.

10. The semiconductor apparatus according to claim 7, wherein the gate insulating film is a monocrystal film including one selected from the group consisting of CeO_2, PrO_2, CaO_2, TbO_2, PrO_2, Dy_2O_3, Er_2O_3, Eu_2O_3, Gd_2O_3, Ho_2O_3, In_2O_3, La_2O_3, Lu_2O_3, Nd_2O_3, Pr_2O_3, Sm_2O_3, Tb_2O_3, TI_2O_3, Tm_2O_3, Y_2O_3 and Yb_2O_3.

11. The semiconductor apparatus according to claim 7, wherein the buffer layer is made of monocrystal SiGe.

12. The semiconductor apparatus according to claim 7, wherein the buffer layer is formed on the silicon substrate through the insulating film.

13. A semiconductor apparatus comprising:

a substrate;

an insulating film formed on the substrate;

a first gate electrode made of a first monocrystal semiconductor material formed on the insulating film;

a first gate insulating film made of a first monocrystal rare earth oxide and formed on the first gate electrode;

a monocrystal Si layer formed on the first gate insulating film;

a second gate insulating film made of a second monocrystal rare earth oxide and formed at a position opposed to the first gate insulating film on the monocrystal Si layer; and

a second gate electrode made of a second

monocrystal semiconductor material and formed on the second gate insulating film.

14. The semiconductor apparatus according to claim 13, wherein the first gate electrode and the second gate electrode are made of a crystalline semiconductor material.

15. The semiconductor apparatus according to claim 13, wherein the first gate electrode and the second gate electrode are made of crystalline SiGe.

16. The semiconductor apparatus according to claim 7, wherein each of the first insulating film and the second gate insulating film is a monocrystal film including one selected from the group consisting of CeO_2, PrO_2, CaO_2, TbO_2, PrO_2, Dy_2O_3, Er_2O_3, Eu_2O_3, Gd_2O_3, Ho_2O_3, In_2O_3, La_2O_3, Lu_2O_3, Nd_2O_3, Pr_2O_3, Sm_2O_3, Tb_2O_3, TI_2O_3, Tm_2O_3, Y_2O_3 and Yb_2O_3.

17. The semiconductor apparatus according to claim 13, wherein the first semiconductor layer and the second semiconductor layer are made of monocrystal SiGe.

18. The semiconductor apparatus according to claim 13, wherein each of the first semiconductor layer and the second semiconductor layer is formed on the silicon substrate through the insulating film.

19. The semiconductor apparatus according to claim 13, wherein, at both end portions in a direction of a gate length, the monocrystal Si layer is formed to

extend above the substrate insulatively in an outer direction away from the first gate insulating film, and a source region and a drain region are formed in elongated portions of the monocrystal semiconductor layer so as to sandwich a region of the monocrystal semiconductor layer below the gate electrode.